

POCKET SERIES NO. 484  
Edited by E. Haldeman-Julius

# Hints on Raising Farm Crops

R. A. POWER, B. S.

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HALDEMAN-JULIUS COMPANY  
GIRARD, KANSAS

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# HINTS ON RAISING FARM CROPS

## FARM CROPS IN GENERAL

The first farmer was the first man, and all historic nobility rests on possession and use of land.—Emerson.

Thus spoke Emerson. We are not only concerned in the use of land, but just what crops are planted in the soil to feed the nation, as well as make possible a method of permanent agriculture. The crops which the farmer raises on his farm today are not new. They were, for the most part, raised thousands of years ago. It will be the purpose of these pages to discuss the crops raised by a majority of the farmers of this country, as well as such timely topics as how these crops may be raised to best advantage. This latter part must necessarily include such matters as the kind of soils best adapted for each crop, preparation of the seed bed, planting, cultivating, harvesting, disease and insect enemies, marketing, and the ultimate uses of these various crops.

When a farmer puts in a quantity of seed of any kind on a valuable piece of ground, he expects to harvest a good crop. Many agencies conspire to prevent this expectation from being fulfilled, such as lack of moisture, too much moisture, damaging storms, hail, frosts, diseases and insects. Therefore, the farmer must contend with these difficulties—overcome them

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if he can—but, in addition, he must give what aid he can to these crops to enable them to reach maximum yields by such methods as he has under his control. Land is too high priced to be tilled, seeded and then neglected, when a little cultivation at the proper time, or a determined effort to rid the crop of diseases or insect enemies, for instance, may spell the difference between success and failure.

Obviously, not every crop raised in this country can be discussed in these pages, due to lack of space. However, there are quite a few crops that are almost universally grown, and we will take these up separately, somewhat in their order of importance. Of these crops, the grain crops are of first importance. A grain crop is a crop grown primarily for its seed. Such crops are corn, wheat, rye, barley, oats, etc. Next in importance are the forage crops. These crops are grown not for their seed, but for the entire plant, such as the leaves and stems. Such crops may be in the green stage, constituting pastures, or they may be cured as hay, for winter feeding of the farm animals. There is still another division of farm crops that we cannot ignore, and this division consists of root crops, such as potatoes, beets, turnips, for example.

It seems almost unnecessary to emphasize the importance of farm crops. In the first place, man is dependent for his very life upon these crops, both directly and indirectly. He is dependent directly upon them as a means of food. Many of the grain crops are capable of being prepared for human consumption. Root

crops are highly relished by man. But even greater than this, man requires farm animals for his existence, and these farm animals could not live and multiply in the vast numbers found in this country, if it were not for the grain and forage crops furnished them by the farmer; and this is especially true when it comes to their winter existence.

What about the choice of crops? What crops should a farmer in a given locality raise? This will depend upon various factors. Climate, soil, markets, etc., will largely determine this for the farmer. A long, hot season is essential for some crops, while other crops mature completely in a shorter period of time. For instance, cotton could not be raised in the northern sections of the country, because the season is altogether too short to allow the crop to mature. Then there is a decided difference in soils. Some soils are naturally fertile, while others are poor, or even sterile. The character of the soil also makes a difference as to what crops will make the best growth. Furthermore, a farmer is not going to use his improved land, and waste his valuable time, growing a crop which does not bring a good price on the market.

While the market quotations exercise a great influence upon the crops raised by the farmer, not all crops are sold on the market. On the contrary, a great deal of the farm crops are "sold" to the farm animals, and these in turn are marketed, or at least their products. Pastures, hays, silage and the grains raised on the

Corn is generally grown in what farmers call a rotation of crops. This simply means that corn is grown one or two years on a certain piece of land, then perhaps oats the next year, and clover for the next two or three years. The manure for land in such a rotation as just described, is best put on before the corn crop. One method that is used by a great number of farmers is to plow up the land that is to be put into corn the following year. This land, unless composed mostly of sand, should be plowed in the fall of the year, and then manure hauled on before spring, at the rate of ten to fifteen tons to the acre. This manure should be disced in, in the spring, so that it may be thoroughly incorporated in the soil. This gives the corn a good start in the spring, because the manure is where the young plants can reach it, and there will be no clogging of the moisture from below.

Different types of soil will demand different operations for preparing the soil in the spring for the seed. When land is worked up to a good tilth in the spring, so that the seed will have the best opportunity of sprouting, we call such a condition of the soil, "a good seed bed." In general, however, it is advisable to disc and then drag the land after it has been plowed. Fall plowing is generally to be preferred, but sometimes this cannot be done, so early spring plowing must be resorted to. After the plowed land is disced, and then dragged with a smoothing harrow, it is ready for planting.

Corn is a plant that needs fairly warm temperature to germinate, or spout, so it is always



planted late than the smaller grains, such as oats and barley, for instance. Usually each community has a standard date, at which time they know that there is little likelihood of late frosts, and feel that they are reasonably safe to plant their corn by this time. In the northern states, this date is usually some time during the month of May.

There are two generally recognized methods of planting corn. One is known as the drill method, while the other method is called the check-row system. Drilling the corn in rows seems to be the most popular method of the two. This consists of a horse-drawn planter, which drops the kernels about a foot apart in the row, with a distance of about forty inches between the rows. The check row system is also done by a horse planter, whereby the kernels of corn are dropped in hill about forty-four inches apart each way. Either three or four kernels are dropped in each hill. This has a decided advantage in one respect, at least, in that the plants can be cultivated both ways, that is, they can be cultivated lengthwise of the field, as well as crosswise, thus enabling the farmer to keep down weeds in an effective manner. There is usually not much difference in the yield of the crop, whether it is drilled or check-rowed, as experiments have shown that the yields are about equal, on the average.

One of the most important factors in the success of a corn crop, is proper cultivation. From the moment the corn is planted, it has to fight a struggle for its existence. Small organisms

will ruin the seed before it even germinates, if conditions are favorable for that process. Cutworms are an annual pest that cut off the plant at night. There are several of such pests that we will discuss later, so will confine our study here to the matter of cultivation. Cultivation simply means the stirring of the surface soil to prevent loss of evaporation, admit air, kill weeds, etc. Shortly after the corn has been planted, it should be gone over with a drag, to tear up what weeds remain. After the corn is up a few inches, it can be cultivated with a regular cultivator. Care must be exercised at this first cultivation, however, so that none of the corn plants are covered too much. One very good way, if using a riding cultivator, is to carry a stick, so that what plants are covered by the shovels of the cultivator, can be quickly uncovered by the driver. The corn should be cultivated after a hard rain, as well as when the weeds commence to show. This keeps the moisture in the soil where it belongs. If the corn has been well taken care of before it gets too high, the weeds will be shaded out when the corn begins to "ear."

Corn is usually harvested with the ordinary corn binder, when used for silage or green fodder purposes. If the grain is wanted separately, then the ears can be snapped off the standing corn before the binder cuts it down. A corn binder is a horse-drawn implement that cuts the corn stalks within an inch or two of the surface of the ground, and ties the stalks together in conveniently-sized bundles. Thus the corn can be very easily handled. The corn

can then be "shocked," or many of these bundles put together in an upright position in the field. This allows the corn to "cure out" so that it will not heat or mould later. A wagon can be driven into the field after the corn has been cut, and the ear corn can be thrown into the wagon and hauled to the corn crib, where it can be kept for future feeding purposes. A corn crib is a small structure with the base narrow, and the top comparatively wide, and instead of having solid sides, the boards composing the sides have a small space between them so that air may be encouraged to pass through the corn, to dry it out.

Another common method of harvesting corn is what is known as "hogging off" corn. This simply means that the hogs are turned into the corn as it is turning ripe, and allow the hogs to do the harvesting. This method, of course, is a labor saver. When this method is practiced, it is a good plant to sow some such crop as rape, during the last cultivation, so that when the hogs are turned in, they will have a more palatable and balanced ration than the corn alone would afford.

Corn, like other farm crops, has to contend with many insects and diseases that work to the detriment of the plant. Such insects, or animal-pests as cutworms, wire worms, corn root louse, white grubs, corn billbug, corn root-worms, grasshoppers, chinch bugs, corn ear-worm, and army worms, as well as crows and gophers all tend to reduce greatly the stand of corn, and, in some cases, even totally destroy the crop.

The most effective treatment for most of these pests consists of fall plowing (which aids in destroying the eggs of these insects) and rotating the crops, so that the corn will not be in dangerous proximity to the remaining eggs that hatch the following spring. Crows and gophers, mentioned as "pests," attack the corn immediately after it is planted, taking the seed away, or destroying the young plants.

It may be said here, that corn is relatively free from plant diseases, when compared with other farm crops. Probably the most serious disease is the smut disease, which is not serious in itself, but only becomes a menace when the smutted corn is allowed to spread. This smut will not harm animals fed on such corn, but it lowers the sales value of the corn, and all smut should be carefully gathered and burned.

Many farmers make a tidy profit from their corn crop by selling seed corn. This can be accomplished by going out into the corn field when the corn is ripening, and selecting the ripe ears that are well shaped, and that are on good healthy, vigorous plants. These ears should then be placed in a well-ventilated building, where they can be cured. This curing consists of allowing free circulation of air through the building, so that the moisture that is given off from these seed ears may be carried away by the moving air, dry air taking the place of the moist air. Even if a farmer wishes to save seed for his own use, for the following year, this plan should be followed, if he wants corn of strong germinating power. Too many

farmers allow their corn to be hung out to dry where it is exposed to the weather, as, for instance, out on the porch, the side of a building, or possibly on the frame of a windmill. This practice will result in poor germinating corn the next spring, unless he is favored with exceptionally dry fall weather, and late freezing.

## WHEAT

The crop next in importance to corn is wheat. Nearly everyone understands that wheat is the source of bread-making flour in this country, and it is raised over a wide range of territory. As we are a heavy bread-eating nation, there is always a market for this product, which is taken by the large flour mills and milled into flour. Wheat is adapted to a variety of soils, growing about as well on one type of soil as it does on another, providing moisture is present or supplied.

There are two general types of wheat, known as spring wheat and winter wheat. Winter wheat is sown during the late summer or early fall, while spring wheat is sown early in the spring. In preparing the land for winter wheat, no essential differences are made, the primary object being to prepare a mellow, firm seed bed, so that the soil is well worked up, and a loose surface made on top of the soil, to check evaporation of moisture. In some cases the land is first plowed, and then carefully harrowed; in others the wheat is seeded on disced or stubble land. If spring wheat is to be

planted, it is a better practice to fall-plow the land, and disc it the following spring, rather than to disc it in the fall.

In sowing wheat, it has been found that a drill gives much better satisfaction than sowing it broadcast. When a drill is used, the seeds are covered, and the wheat is planted at a uniform depth, which is not possible with a broadcast seeder. It is not advisable to plant the wheat very deep in the soil, but just deep enough to allow the wheat to secure sufficient moisture for germination. If planted too deep, the wheat seedlings will experience difficulty in forcing their way up to the surface of the soil.

Wheat, like the other small grains, is not a cultivated crop, and is sown in rows very close together. Consequently, after the crop has been put into the ground, nothing much can be done to encourage its growth. Occasionally, wheat that has been drilled is harrowed after it is up, to give the weeds a final combing, but this should always be done in the same direction of the drilled rows, and never crosswise of the rows.

In most sections of the country, wheat is harvested with grain binders, which are horse-drawn implements that cut the plant close to the ground, and then tie them up into bundles that can be easily handled for curing and threshing purposes. In a few sections of the country, a machine called the header is used, whereby just the tops of the plants are harvested, but the more common method is by means of the grain binder, already mentioned.

After the grain has been cut by the grain binder, already mentioned, the bundles of wheat should be immediately gathered and put into shocks. This consists of piling about a dozen of these bundles together, standing them upright, and leaning them one against the other, with a couple of bundles placed on top. This enables the wheat to rid itself of considerable moisture before being threshed.

Some farmers prefer to stack their grain before threshing. This is to be commended, as the wheat is protected from damaging rains, and also is enabled to go through what is known as a "sweating process" before being threshed. A certain amount of skill is needed to be able to stack grain, as the pile is made wide at the base, and gradually tapers to the top.

Some farmers thresh from the shock, while others thresh from the stack. Unless a farmer is reasonably sure that he can get a threshing machine to come to his farm at the right time, he is far safer to stack his grain, rather than to take a chance on the weather. Of course, shock threshing is cheaper, as the grain does not have to be handled as much by this method, but a better color and quality of grain can be secured by first stacking it, and stacking is a good insurance or protection against damaging storms.

There are only two very serious diseases that attack wheat: rust, which attacks both the leaves and the stems, and smut. Both are due to fungi, and no successful treatment has yet

been devised to overcome these diseases. Some varieties have been developed that are more resisting to rust than other varieties, but there still remains considerable work to be done before wheat can be entirely free from rust. Smut also exists in two forms, known as "loose smut" and "stinking smut." Loose smut is very difficult to control. Some farmers soak the wheat in cool water about four hours, and then soak it for about ten more minutes in hot water having a temperature of about 129 degree Fahrenheit. The stinking smut is more easily controlled by soaking the wheat in a formaldehyde solution. The strength of this solution should be about one pint of 40 per cent formaldehyde to forty-five gallons of water. As the spores of this disease are contained on the outside of the wheat kernel, this strong solution kills them.

Chinch bugs, Hessian fly, and grasshoppers annually exact a heavy toll from the wheat crop. These pests are difficult to control, but in general, they are best handled by fall plowing, rotation of crops, and burning any rubbish that has accumulated, so that they will have little opportunity to live over winter.

The marketing of wheat is constantly becoming a more and more important item to the farmer. One of the disadvantages of farming, is the poor system of marketing the farm products. The farmer sells his products for what the market will pay, instead of on the basis of what it cost him to raise the crop. It can be seen that he is at a disadvantage in this respect. Compare him to the manufacturer, for



instance. The latter makes up his product, figures out what it cost him to make the product, and then adds enough for a reasonable profit. But the farmer cannot do this, due to unorganized marketing. All he can do now is to watch the markets, and then when his wheat, or any other commodity, reaches a high point, he will haul it to town and sell it, if he is so situated as to properly store the product without loss. More often, however, he has to haul his grain to market immediately after it has been threshed, as he lacks storing space, and thereby is forced to accept the prevailing market price at the height of the harvesting season, which price is usually at a low point. Much is now being done, however, to provide storage warehouses for the farmers products, rendering him independent of such conditions. There has been much speculation in wheat in the past, at the farmer's expense, but with better marketing facilities, this will probably be eliminated.

## BARLEY

Barley as a grain crop, is not raised as extensively as either corn, wheat or oats. However, recent experiments have shown that it has an excellent feeding value, when mixed with other feeds, for farm animals, especially hogs and dairy cattle. It was previously raised in this country for malting purposes, but is now used chiefly as a feed for farm animals. Barley is one of the oldest grains known to man, it being mentioned in one of the first books of the Bible.

Barley does its best on a soil that is neither too light nor too heavy. A well-drained loam, rich in fertility, is the best barley land. This crop is primarily a surface feeder. Its roots do not extend as deep as wheat or oats, which explains why barley is a crop that needs fairly rich top soil to grow successfully. Care should be taken that the ground is not too heavily fertilized with barnyard manure, however, because too rank a growth of straw might result, which would encourage the barley to lodge, or fall over.

The same precautions in preparing the seed bed for wheat should be taken when getting the ground ready for barley. Fall-plowed land is to be preferred, because the land can be worked up quicker in the spring than spring-plowed land. Barley is a crop that can be put in quite early in the spring, it is therefore, obvious that fall-plowed land is quite an advantage. It is especially desirable that with barley, none but the largest and plumpest seeds should be sown, because this is the best way to promote an even stand, and a vigorous crop.

Barley is generally sown at the rate of two bushels to the acre, unless in a dry section, where the quantity is reduced proportionately. Much better yields can be obtained, as in the case of wheat, by sowing with a drill rather than a broadcast seeder. Like wheat, it is not a cultivated crop, so little labor is demanded in growing this crop.

The harvesting of barley is done in a somewhat similar way as wheat. When the barley is in the "hard dough" stage, it is cut with

a grain binder, and is gathered and set up in shocks. The shocks are allowed to cure out for about ten days or more, before they are piled in stacks. Because a bright yellow appearance of barley adds considerable to its market value, it is good business to stack the barley, as the farmer takes quite a chance when he leaves it in the shock until threshing time, which is sometimes several months after harvesting. There are a few sections of the country, however, where there is little danger of rain during threshing time; in these localities shock threshing is a common practice.

Not much need be said in regard to the insects and diseases of barley, as they are practically the same which ravage our wheat fields.

Barley and oats are used in a similar manner in the rotation of crops. They usually follow a corn crop, and precede a grass crop. Barley has been used in the past quite extensively as a nurse crop, as it is less apt to smother the grass crop, and is not so severe as other nurse crops in extracting moisture from the soil, which is needed by the grass crop, being "nursed." However, we will discuss the value of a nurse crop a little more in detail in our next chapter under oats.

## OATS

Oats are widely grown in this country, especially in the northern part. They are exceeded in acreage only by wheat and corn in the grain class. While not as old a plant as barley, still records show that the early Greeks

and Romans raised oats as one of their standard crops. Oats do well on a variety of soils, but give the best yield on loamy soils, that are fairly moist, as oats draw quite heavily on the moisture supply of the soil, especially at the time of ripening. Oats do better in a cool climate than in a hot one, and are one of the first seeds to germinate in the spring. For this reason, oats are usually planted as soon as possible in the spring, as this gives them a good start, permitting them to attain their growth before the intense summer heat sets in.

We might mention here the same precautions in regard to the manuring of oat land that were given in regard to barley in the previous chapter. Ground freshly manured is quite liable to cause the oats to lodge, or to fall over on the ground. Even land that is plowed, while no manure is applied the same season as oats are sown, often causes the oats to lodge. Many farmers prevent lodging of oats to a large extent by not plowing their oat land, but simply discing it, and then sowing. This gives the oat plants a better balanced ration of the plant food elements. When oats are raised on the same land two or more years in succession, then the ground had best be fall-plowed, and then disced in the spring.

The choice of seed oats is an important matter, and is worthy of the farmer's attention. It will pay him to run his seed oats through a fanning mill to clean out the light, immature seed, as well as what foreign matter there might be present, such as dirt, chaff, etc.

Light, immature, shriveled kernels are slow to germinate, and sometimes fail to germinate at all; a farmer, therefore, loses to the extent that he sows these inferior oats. A fanning mill will clean out these undesirable seeds, and leave nothing but good healthy oats which will grow into a vigorous plant. Another important point to be noticed in this connection, is the matter of treating seed oats for smut. Smut is a common disease with oats in many sections where they are raised, and a great annual loss is incurred by farmers every year from this disease. This smut, which was briefly mentioned in connection with wheat, is caused by a fungus, which attacks the plant about ripening time, and replaces the kernels, so that the farmer is usually not aware of the great loss it causes. The spores of the smut spread about ripening time to the other healthy kernels, and live unmolested in this stage until these healthy kernels are used for seed the next spring. Then the smut begins to grow as the kernel sprouts, and sends up fine thread-like hairs through the stalk of the oat plant, and then again replaces the kernels with a mass of smut. This calls for treatment every year, if the farmer wants to be sure that he will be free from this disease. The treatment consists of the formaldehyde bath, explained in detail under the chapter on wheat.

Oats are harvested in a manner similar to that of wheat and barley. They are cut, when ripe, by a grain binder which ties them into conveniently sized bundles. They are then shocked, as previously described, and allowed

to cure out. They can be stacked later, or left in the shock, but better results will be obtained if they are stacked before being threshed.

The insects and diseases that attack the oat crop are the same that harm the wheat and barley grains. As was said before, there is little chance to combat rust successfully, but the treatment for smut has already been given.

Oats are used in rotation the same as barley, that is, they follow a corn crop, and precede a grass crop. When the oats are sown, it is customary to sow the grass crop at the same time, if a legume, as alfalfa and the clovers require two years to become fairly established. If the oat crop is harvested the first of August, for instance, and clover was seeded with the oats, then the clover will continue to make growth after the oats have been removed from the land, but should not be pastured to stock this year. This gives the clover a chance to make sufficient top growth to withstand the winter, in order that a good crop of clover can be had the following summer.

Oats are becoming more and more popular as a nurse crop. This is especially true with alfalfa. But when this crop is used as a nurse crop with alfalfa, it is cut before the oats ripen, and used for hay. The reason for this operation is the following: if the oats are left to ripen, and later cut for grain, during this ripening process, they draw heavily on the moisture supply of the soil. But this period is just the critical time of the young alfalfa's

life. It is usually quite hot and dry at the time of cutting oats, and if the alfalfa plants are denied a fair portion of moisture at this time, they will not all survive the ordeal, with the result that only a portion of the stand will be obtained that could be had under the other system. Consequently, an increasingly number of farmers are following the method of cutting the oats green for hay, rather than allowing them to ripen, when alfalfa is sown at the same time as the oats.

Oats are a crop that is used widely on our American farms. All horses relish oats as a feed, while cows, hogs and chickens thrive well on this feed, either as whole oats or ground. Oats are also used as food by people of some countries in the form of oat-meal or "porridge," a breakfast cereal. One of the best products from the oat crop, besides the oat grain, is the straw. Oat straw is ideal for bedding the farm animals, and also contains some feeding value, but oat straw is not to be recommended as a farm animal feed, unless there is an acute shortage of hay.

## MISCELLANEOUS GRAIN CROPS

One of the important grain crops grown in this country is rye, although this crop is largely grown as a catch or cover crop, as well as a grain crop. Rye is probably grown more as a grain crop in some of the European countries than it is in our own country, as rye bread is used to a large extent in Europe. The rye grain is not very popular in this coun-

try for feeding farm animals, as it is subject to a disease called ergot, that is harmful to cattle, especially.

We used the expression "cover crop," and stated that rye is very popular for this purpose. A cover crop is a crop sown on the land after the regular crop is removed, so that the land does not wash, especially on hilly land, and that the organic matter of the soil can be replenished. It is a very common practice, in this country, to sow this on the land after a crop such as tobacco, has been removed. Rye is allowed to grow as high as it can during the fall of the year, and in the spring, before it is a foot high, it is plowed under. This greatly increases the humus matter of the soil, and thereby improves the physical texture of the soil. A common mistake amongst farmers, however, is to allow this rye to grow too rank, so that when it is plowed under, it interferes with the moisture coming up from the lower soil. This occurs when the rye is allowed to grow too tall. Consequently, if a dry season occurs, the following crop is shy of moisture, because of this interference with the natural capillary rising of moisture from the sub-soil to the top-soil.

Rye will grow on nearly any kind of soil and, for this reason, is often raised on soils low in fertility. However, it does its best on rich soils. We have two distinct kinds of rye in this country, known as winter rye and spring rye, but the winter rye is by far the most popular. Owing to the fact that rye is capable of mixing with other varieties, we have no distinct



types of rye as we do of wheat, oats and barley, because these other types of grain are self-pollinated. After the summer crop has been removed, the land should be worked up, or at least disced, and the rye sown as soon as possible. In the green stage, it affords the farmer a good late fall pasture, or an early pasture for his cattle, should he need it, because cattle pasture is often quite scarce at these particular times.

If rye is to be used as grain, it can be sown in September in the North, or in October in the South. It will then be in shape to harvest in good season the following summer. As the method of harvesting this crop is the same as the other grain crops already discussed, we will not repeat these operations.

Ergot has already been mentioned as the prevailing disease of this plant. It appears as black or purplish spots on the kernels, and is easily seen about harvest time. The best method of eradicating this disease is by rotating the crop. This ergot, when fed to cattle in the rye, is liable to cause abortion amongst the cattle; it is, therefore, seldom fed to cattle. Rye is less susceptible to insect ravages than wheat and oats, but the same remedies are resorted to when these pests do appear.

## FLAX

Flax is a crop that is grown to a large extent in this country. This plant is capable of being put to a variety of uses, and therefore is quite popular in some sections, at least, as a

cash crop, or a crop that will supply the farmer with ready cash. Many different kinds of cloth are made from the flax fiber, and flax seed is used for a variety of purposes. The seed is too high priced to be used as feed for the farm animals, as the seed can be pressed, or heated, and a valuable oil is extracted, which is used as an ingredient of paints, varnishes, etc. This is called linseed oil, a product familiar to the average housewife. But we still have a further use for this seed even after the oil has been extracted. The remainder is very rich in protein, and is prized very highly by feeders of live stock. It is marketed as linseed oil meal, and cattle and other animals relish it in this form.

Flax is a common crop in newly-settled districts, as, for instance, on some of the land west of the Mississippi. It is especially valuable as a first crop on land that has never been cropped before, as it has been found excellent in preparing the tough sod for agricultural purposes. Many settlers have been known to put their entire farm into flax the first year, and pretty near pay for their land if they had a good flax year. The crop will not stand constant seeding, however, on the same land, as the ground soon becomes "flax sick" if put into flax continually.

On old land, just as much pains should be taken in the preparation of the seed bed as for any other grain crop, but on new, or virgin soil, the new sod is often just turned over flat in the fall or early spring, running the disc sharply in the spring over the fall-plowed soil.

Even on new land, the extra work involved usually pays for itself in the increased yield.

Flax is a crop that should be ripe at the same time. For this reason, it is advisable to take particular pains with the selection of the seed. The seed should be run through a fanning mill so that all foreign matter, and light, immature seed may be discarded. If nothing but uniform seed is sown, and planted at a uniform depth, then the plants should all mature at the same time. In order to prevent a disease known as the flax wilt, the formaldehyde treatment should be applied, which was described under wheat.

Half a bushel, or better, is the usual rate of seeding flax to the acre. This rate of seeding, while probably appearing to be a small amount, will produce best results, as it will encourage the flax to branch out and produce a heavier yield of seed than if a larger quantity were sown. The seed should be sown with a grain drill, covering the seed about one inch in depth. If, however, the seed is sown for fiber instead of the flax seed, then from one to two bushels should be sown per acre.

In this country, where flax is largely raised for its seed, the crop is harvested as has already been described for the various grains. For fiber flax, an entirely different process is used, which, however, we shall not take the space here to explain.

One of the minor grain crops is buckwheat. This grain is used largely in the manufacture of pancake flour, although it makes very good

feed for some of the farm animals, especially for poultry and hogs.

Buckwheat does exceptionally well on poor soil and in some of the less fertile soils of this country, this crop is quite popular. Some of the eastern states raise considerable buckwheat, New York and Pennsylvania being the leading growers of this crop. Buckwheat makes a quick, rapid growth, and is an excellent crop for plowing under or smothering out weeds.

Buckwheat is seeded at the rate of about a bushel to the acre. It is sown either with a grain drill or a broadcast seeder. This crop is not cut with the ordinary grain binder, but with an implement known as the self-rake reaper, and is cured in bunches, these bunches not being tied as the previous grains were that we have discussed. It is not stacked as these other grains are, either, because it is quite liable to mold in the stack, but is hauled to the threshing machine direct from shocks where it has been left to cure.

## MEADOWS

A meadow is a piece of land devoted to the making of hay, or winter roughage for the farm animals. There are many different kinds of grass seed used for hay purposes, but the standard kinds of hay in this country are alfalfa, clover and timothy. There are many meadow lands on our American farms that have produced crops of hay continuously for many years, with low yields as a result of this practice.

There are some important points to be observed in the maintaining of a good meadow. The plants which compose the meadow should form a smooth, even turf of ground, rather than a bunchy surface, as it is essential that the ground be smooth for the efficient operations of the haying implements—the mower, raker, etc. There should be enough seed sown so that the stems do not grow too coarse, and that weeds may be properly kept down. Only those plants should be used that cure readily into hay, as slow curing is a detriment to palatable hay. As the stems of the hay plants constitute one of the chief parts of the hay, it can be readily seen that these should not be too tough, nor allowed to grow too rank, because cattle will discriminate against such coarse feed. Hay plants usually have considerable food value in their leaves, and especial care should be excersised in seeing to it that these leaves are not spoiled or lost in harvesting the hay.

Anyone familiar with grass seed knows that this seed is quite small in size. Therefore, in preparing the seed bed for either pasture or hay land, it is even more important that the seed bed be worked up into a fine condition, for many of these small seeds will fail to germinate on a poorly-prepared seed bed. Firmness, mellowness and moisture are the three essentials to be kept in mind when preparing the land for new seeding. Furthermore, maximum yields cannot be expected unless the meadow land is fertile. If the grass seed is being sown alone (that is to say, with-

out a nurse crop), a light application of manure may be plowed under with beneficial results. However, if a grain crop is being seeded at the same time, as is commonly practiced when clover or alfalfa is being sown, then the manure should be applied previously, as the manure applied the same year as the grain crop will encourage the grain, or nurse crop, to lodge.

The selection of the seed is of first importance. Any farmer will testify to the impurity of common grass seed sold on the market. A farmer usually has enough weeds on his land without buying any weed seed mixed with his grass seed. Many states demand that the purity of the seed be stated on the container in which he purchases his seed. This is an excellent law, when it is adhered to. There are many noxious weed seeds that closely resemble ordinary grass seed, and the farmer should see to it that he is not being cheated. An ordinary hand lens can be used to advantage to detect these noxious weed seeds, or perhaps even a better way for the farmer is to send a sample of the seed, if there is any question in his mind as to the purity of the seed, to his state agricultural college, and have them analyze the seed as to its purity.

Another factor that is too often neglected by the busy farmer, is the matter of germination of the seed. As has been stated before, germination of seed means the number that will sprout, when placed under favorable conditions. For instance, if 93 seeds out of one hundred sprout, then we say that the germination of that seed is 93 per cent. But many

farmers say that they do not understand how to test out their seed for germination. This is a very simple matter. Just take two saucers and cut two pieces of flannel cloth or heavy blotting paper to fit the two saucers. This is all the equipment that is necessary. Then count out a standard number of seeds. 100 seeds is a convenient number. With the small grass seed, this can be done very easily with the aid of a tooth-pick. Next moisten the flannel cloth or the pieces of blotting paper, whichever is used, and place the cloth or blotter in each of the saucers. Then place the 100 seeds to be tested on one of the saucers containing the blotter, or cloth, and cover this with the other saucer with the cloth or blotter fitted inside it. Keep this in a warm room, and moisten every day, or at least every other day. Most seeds will germinate inside of two weeks under this treatment. Grass seeds are somewhat slower in germinating than are other seeds; some, such as Kentucky Blue Grass, even taking three weeks to sprout. By this process, the farmer can soon get a very good idea as to the viability, or life, of his seed. Not only grass seed is capable of being tested in this manner for germination, but many of the larger seeds respond to this method of testing. If a farmer finds that some of the seed that he is planning on sowing in the spring is low in germinating, he can save a good deal of waste by sowing extra heavily of this seed, thereby allowing for the poor germinating power of the seed in question.

There are various methods of sowing grass

seed. It may be broadcasted by hand, which consists of simply scattering it as uniformly as possible by hand, or it may be sown with the regular broadcast seeders. Also there are certain attachments that come with some makes of grain drills that make this seeding a simple process. The wheel-barrow spreader, or seeder, is also used to quite an extent, and this perhaps gives about as even distribution of seed as any system. As grass seed is quite small, there is always a danger of covering the seed too deep. Unless in a dry climate, the seed can be sown on top of the land, and then a smoothing harrow, or drag, can be run over the seed, covering it from one-half to one inch in depth. Better results can be secured by covering it only half an inch than an inch deep.

Most meadows are plowed up after a few years, and put to other uses, such as corn, small grains, etc., according to the prevailing rotations for particular sections of the country. However, on low land, or land that is not capable of raising a good crop of these other farm products, permanent meadows are quite common. It is a common practice to pasture new seeding in the fall of the year by farmers who find that they have run short of pasture or some other form of feed. This is a practice that should be tabooed, because with leguminous plants, which require two seasons to produce a crop, they are greatly weakened and often fail to survive the rigid winter weather of the North. These plants need all the top growth they can make during the first



summer to protect them during the winter, and the farmer is well repaid the next season, in a sure crop, and a heavy yield, by insisting that the first year's seeding be unmolested.

There are various mixtures that are used for hay purposes, but perhaps the most common mixture is timothy and clover. Timothy is a very hardy plant, and seldom dies in winter. Clover is more susceptible, however, to winter-killing, and the farmer usually mixes timothy seed with his clover seed, so that if, for any reason, the clover fails to come up, he still has the timothy to fall back on. Timothy is raised to a large extent for hay all over the country, as it is an especially good feed for horses, although not so good for cattle and hogs. There are various kinds of clover raised for both hay and pasture purposes, and the details of raising these clovers will be reserved for a separate chapter, but it may be said now that clover is well thought of, both for hay and pasture, by most American farmers. Alfalfa will also be treated separately.

We will close this chapter with a few words on the manner of making hay. Hay, as a rule, is cut when the plants are in bloom. Some kinds demand cutting before this time, however, as there would be a large loss of leaves if they were allowed to ripen too much. The hay crop is cut with a mower, and then raked into either wind-rows or in cocks. The hay is left in this condition for a day or two, so that some of the moisture of the green hay can be evaporated. When the hay that is left

to cure is exposed to rain, a serious loss in the feeding value of the hay is suffered by the farmer. When the hay has sufficiently dried out, then the farmer loads the hay on a hay-rack, and stores it in his barn for winter feeding. The hay can be loaded on the hay-rack much easier by means of the modern hay loader, although this machine cannot be used on very hilly land. The old-fashioned method of "pitching" hay with the fork is still used by many farmers, however.

## PASTURES

Pasture land is found on nearly all farms in this country, and it is safe to say that over a billion acres of land in America are devoted to this purpose. Pasture, as nearly everyone knows, is land seeded to one or more grass crops, in order that the farm animals may graze or feed on the crop while it is in the green stage. During the summer months, this method affords ideal feed for the various farm animals. The best land on the farm is not generally chosen for pasture land, but rather meadow land that has become low in fertility, or hilly or low land on which it is difficult to cultivate other farm crops. However, many farmers prefer to include their pasture land in a system of rotation, but this has a drawback in that the best pasture plants do not give the highest returns always for the short time the pasture is allowed to remain as such.

One of the most practical methods of establishing a pasture is to convert a meadow that

has produced a few crops of hay into pasture land. Such crops as white clover and Kentucky blue grass usually find their way into these old meadows, and seed themselves, thus saving the farmer the work of especially preparing a separate pasture. Some farmers plan to leave their old meadows that have been seeded to a mixture of red clover and timothy to provide pasture for their cattle, but these plants are not ideal for pasture, due to their inability to stand the tramping of the cattle. In a few of the western states, some farmers have successfully used alfalfa as a pasture crop. This practice is not general, although alfalfa makes an ideal feed for the animals during the summer time. A combination that has been gaining favor within the past few years with many farmers, especially when their alfalfa or clover failed to survive the winter, is a combination of oats and Canadian field peas. This has been used successfully as an emergency hay crop, perhaps even more than an emergency pasture crop. However, as a pasture, the cattle should not be allowed to graze on this mixture until the peas are commencing to pod.

There are numerous kinds of hog pastures, varying with the location in different parts of the country. Alfalfa has also been used with great success for this purpose, but in a somewhat restricted area west of the Mississippi. Rape makes a very good hog pasture, either when sown alone, or when mixed with other seed, such as oats and Canadian field peas. In fact, too little attention has been given the matter of pasture for hogs in the past. For

growing pigs, it is much more profitable to provide them with a nutritious pasture, which will encourage them to forage around and secure the exercise that they need, as well as to reduce the cost of producing a pound of gain. When pigs are fenced up in a little lot, where no inducement has been provided to urge the pigs to rustle for themselves, they will seek a shady spot and stay there until they are fed some high priced feed by the farmer at the regular feeding hours.

Some of our farm land has been devoted to pasture for a great number of years, and when such a permanent pasture is to be maintained, it should receive extra seeding occasionally, as well as a loosening of the sod, as this sod will likely become sod-bound in time. Weeds can be cut when they are found too numerous. These should be cut with a mower before they blossom, so that they cannot spread by their seed. If the old pasture land is occasionally disced, and grass seed sown at the same time, it will invigorate the pasture for the following years with the minimum expenditure of time and money.

It is a common experience amongst farmers to find that their pastures dry up during a protracted dry spell. This is particularly true of pastures containing any great amount of Kentucky blue grass. Because of this fact, the farmer will be money ahead if he provides for more pasture land than he would need during a wet season. This is best accomplished by having two pastures, and alternating his cattle from one pasture to another, thus allowing the

depleted pasture a chance to revive itself, while the stock is grazing on the other pasture. Other farmers practice a method known as soiling, especially on high priced land, which consists of cutting green plants and hauling them in to the cattle in a small enclosure. This saves considerable tramping and waste of the green feed, but it involves a larger outlay of labor. Some of the big dairy farmers get around this pasture shortage very nicely, by having a summer silo, so that when the pasture runs short, they can open up their extra silo, and keep the animals up in milk and flesh by this means.

In order that a clearer idea of the important plants that compose meadows and pastures may be had, we will next take up some of these plants, explaining their best methods of culture, etc., separately, so that the principles governing their most favorable growth may be better appreciated.

## ALFALFA

Alfalfa is one of the oldest plants used by man in feeding farm animals, but is a comparatively new crop to this country. It was first raised successfully in this country along the Pacific coast, but did not grow very abundantly east of this section. However, it was such a wonderful crop, that constant attempts were made to raise alfalfa east of the Pacific states, and these attempts finally met with success. An early settler of Minnesota, Wendelin Grimm, achieved quite a reputation

amongst his neighbors for the splendid condition of his stock in the spring of the year. When he migrated from Germany, he brought with him some hardy alfalfa seed, which he termed the "everlasting" alfalfa. He attributed the fine condition of his cattle to this alfalfa that he raised continually on the same field. Other farmers in other neighboring states had failed to have much success with their alfalfa because it was so easily killed during the winter. Grimm gave his neighbors some of his seed, and they had about as good success as Grimm did. This "everlasting" alfalfa finally attracted the attention of the Minnesota College of Agriculture, who soon procured some of Mr. Grimm's seed, and disseminated it to other localities. To-day this seed has the reputation of being the best variety of alfalfa, due chiefly to its hardiness.

As we have said previously, alfalfa can be used as a pasture plant as well as a hay crop, but its use is largely confined to hay with most alfalfa growers. From two to four cuttings, or crops can be harvested from the alfalfa acreage in one year, depending upon the length of the growing season. In the northern states, usually two or three cuttings are made. Many of the northern states are commencing to confine their cuttings to two crops, because they have found that they are much more certain of a good stand the following year when they leave a good top growth to protect the plants over winter.

There is one particular reason why alfalfa has not become universally popular, and that

is due to the fact that alfalfa demands a few specific conditions in order that it may thrive, and not many farmers are informed on these matters. It may be said that many farmers have tried out alfalfa, but they were not successful in securing a stand, so consequently, gave up the effort, thinking that alfalfa could not possibly grow on their farms. This is hardly true, however, as alfalfa can be made to grow almost anywhere, if conditions are made favorable for its growth.

We will now discuss some of these points concerning alfalfa, and possibly succeed in persuading some farmer who might read these pages to give alfalfa a fair trial. We might as well begin with the seed. There are all kinds of seed on the market, advertised as Grimm's genuine alfalfa seed. As all varieties of alfalfa seed look alike, it is difficult for the farmer to tell whether he is purchasing Grimm seed, or some of the common strains, until after he has raised it. A very safe method in securing the genuine Grimm seed, is to get in touch with reliable parties, such as the county agricultural agent, the Farm Bureau representative, or the state agricultural college, and have them secure the seed from sources that they know are reliable. This seed usually costs about fifty cents a pound, while the common strains are much cheaper, but a hardy variety, such as Grimm's, is well worth the difference in price.

It is now advocated to sow not less than fifteen pounds to the acre. This enables the new crop to hold its own against weeds. Another

essential point that must be kept in mind, is that the land must be well drained. Low land is not wanted for raising this crop, because the alfalfa plant sends down its roots for many feet into the soil in search of food, and if the seed is sown on low, wet land, the roots will be quite limited in their feeding area, and also a lack of air will be evident in the soil. Hence, the land selected for alfalfa should be high, well drained soil. Failure will result if this is not adhered to.

The next important item that contributes to successful alfalfa growing is the matter of soil acidity. Alfalfa will not thrive on sour, or acid soil. This fact alone has been the cause of countless failures in raising alfalfa. A sample of the piece of land selected for alfalfa can be sent to the county agent, or to the state agricultural college, and be tested for acidity. Most soils in humid, or wet, climates need lime to correct the acidity of the soil. Burnt lime, or pulverized limestone can be applied at the rate of from two to four tons to the acre, which is usually sufficient to make the soil "sweet."

Inoculation is the last item in successful alfalfa raising. This is because alfalfa manufacturers nitrogen, an important plant food, by means of minute bacteria housed in the roots of the plant. These bacteria convert the nitrogen of the air into nitrogen that the plant can use. But these bacteria refuse to work in a sour soil. Therefore, if the soil has once been acid, or sour, these bacteria will probably be absent. Therefore, they will have to be supplied artificially. The easiest way in which this



can be done is to buy a small bottle of alfalfa bacteria culture from a seed house, or from an agricultural college, and sprinkle the liquid culture over the seed, just before planting. This will supply enough bacteria to start the young alfalfa plants in good shape. Another, more laborious method, is to haul some soil from a field that has already grown alfalfa, to the new piece, that is to be put into alfalfa. A few loads per acre is all that is generally needed. This involves much of the farmer's time and energy, and when it is considered that a bottle of the bacterial culture can generally be purchased from the state agricultural colleges for about twenty-five cents, it is hardly worth while to haul the soil on to the new field. If these few requirements that have been mentioned are provided, a good stand of alfalfa should result. To repeat, these requirements are: hardy seed, well drained land, land free from acidity and proper inoculation. This may seem like rather exacting demands by the alfalfa plant, but when the value of alfalfa is compared to other hay or pasture plants, the effort is very much worth while.

What has been said in the proper preparation of the seed bed for other grass seed especially applies to alfalfa. We will not repeat these directions, but suffice it to say that a good seed bed is imperative. Alfalfa can be seeded in at least two different ways. It can either be sown on land the middle of the summer that has been worked periodically during the summer to preserve moisture and kill weeds, or it can be sown with a nurse crop,

such as oats or barley (the latter being cut for grain or hay), thus getting a crop from the land the same year. Probably the most practical method for the farmer who does not want to waste his alfalfa ground the first year, would be to sow the alfalfa seed in the spring with oats, and cut the oats for hay, rather than to allow the oats to ripen into grain. When oats or barley are used as a nurse crop, and cut for grain, rather than hay, there are strong possibilities that the alfalfa will be robbed of a considerable amount of moisture through the ripening process of the grain. This is about the time that alfalfa needs the moisture the most; therefore, unless the nurse crop is cut green for hay, the young alfalfa plant is quite liable to suffer for lack of moisture, unless the season happens to be a wet one.

After alfalfa has been sown under proper conditions, there is little left to be done until the crop is ready to harvest. Sometimes the weeds get a start on the young alfalfa, and when this condition prevails, it is well to go over the field with a mower, and cut the weeds as high as possible from the ground, so that they cannot reproduce themselves by seed. This clipping will not harm the young alfalfa plants, as they will leaf out again quite readily after this treatment.

There is a diversity of opinion as to the proper time for cutting alfalfa for hay. Where three cuttings are made in a single season, it is the custom to cut each crop just as the plants are commencing to bloom, so that the following crop will not be retarded. But in the

northern tier of states, where the growing season is somewhat shorter, some farmers prefer to make only two cuttings, so as to provide for good insurance against winter-killing. Then it is best to wait until the plants are in full bloom. However, if left too long, the leaves will commence to fall off, and much of the most valuable feeding portion of the plant will be lost. Anyone who has had the pleasure of feeding alfalfa hay to dairy cattle will testify to the fact that the leaves of the alfalfa hay are greatly relished by the cattle. The cows usually eat first as many of the leaves as they can get, even to the extent of "nosing out" the bulk of the hay on the barn floor in front of the manger, before eating the remainder of forage.

The harvesting of alfalfa deserves a word of attention. With the modern side-delivery rake, much of the hay is now raked into windrows, where it is left to cure in a fluffy mass. Another splendid way by which alfalfa hay can be cured is by the old-fashioned system of putting the hay up in small bunches, or cocks. When this method is followed, hay caps should be provided, if quality hay is to be expected, for a rain storm falling on these bunches during curing is bound to spoil the quality. This precaution, of course, involves a little more labor, but it pays in the long run, except in a dry climate where rains are not frequent.

The value of alfalfa for feeding purposes can probably be better realized when it is stated that it has a feeding value about equal to ordinary wheat bran. Well cured alfalfa hay has

about 11 per cent protein in it, which is one-third more than clover contains, and more than three times the amount of protein contained in timothy hay. As this element, protein, is the highest priced feed the farmer has to feed, it can be readily seen that alfalfa is an extremely desirable crop on any farm. Alfalfa can be fed to hogs, sheep and poultry, as well as to cattle. Some farmers follow the practice of running it through the ensilage cutter, chopping it up fine for small pigs and poultry. It is greatly relished by these animals in this form. In some of the irrigated sections of the west, alfalfa is raised as a cash crop. It is baled by hay-baling machines, and shipped to different parts of the country, usually selling at a good price. The farmer does not now realize as high a profit by selling this hay as he formerly did, owing to the increased cost of transportation. But this obstacle has proved a blessing in disguise to some farmers, as they have been forced to stock up with more cattle to feed on the home farm, thereby increasing the fertility of their farm, and insuring a more steady income, especially in cases where they bought dairy cattle, and sold their cream to a creamery.

## CLOVERS

Much of what has been said in regard to the proper methods of raising alfalfa can be applied to clover. Clover is also what is known as a legume, or a plant that has nitrifying bacteria in its roots. There are quite a few different species of clover, but we will confine

our discussion to the important farm clovers in this country, such as red clover, alsike clover, white clover and crimson clover.

Red clover seems to be the most popular variety of the clovers. There is another closely related clover that largely resembles red clover, and this is the mammoth clover. Mammoth clover usually grows a little ranker than red clover, and matures somewhat later. Otherwise the two varieties are quite similar. Red clover is especially popular east of the Missouri River, in the northern section of our country, but it does not appear to thrive as well in most of the southern states. No doubt it would be as popular in the western part of our country also, but for the fact that alfalfa is so easily grown in the west.

Much the same methods are used in sowing red clover as we discussed under alfalfa. Sometimes, where winter wheat is commonly raised, the clover seed is sown with the winter wheat, in the late summer, with good results. As winter wheat is removed from the land comparatively early, makes little shade, and is moderate in its moisture demand, it makes a splendid nurse crop for the new seedling. Clover is often sown in connection with timothy so that if the clover, for any reason, fails to survive, the farmer still has the timothy to see him through. Usually, a little more timothy seed is used than clover seed, the proportion generally being about nine pounds of timothy per acre, to about six or seven pounds of the clover.

The correcting of the soil acidity, inocula-

tion for bacteria, methods of harvesting that were taken up in detail under alfalfa, apply to the clovers as well as to alfalfa. However, clover bacteria are usually more numerous in the soil, due to a previous crop than are alfalfa bacteria; it, therefore, is hardly ever an important practical consideration. The bacteria that work on the roots of alfalfa plants are not the same kind that work on the clover plants, and this means that a piece of land that has previously grown clover successfully would not necessarily grow alfalfa, and vice versa.

Another quite popular variety of clover is alsike clover. Alsike clover does especially well on low, wet lands, where other clovers fail to thrive. This plant has a longer, more slender stem than the other clovers, and, for this reason, it is quite liable to lodge if sown without some other crop, such as timothy to brace the stems. Unlike red clover, it produces but one cutting per year, but the quality of the hay is excellent. Alsike clover persists usually for three or four years, which is longer than the farmer can count on red clover staying with him.

White clover, previously mentioned in connection with Kentucky blue grass as a pasture plant, is quite common. It is a low creeping plant, the stem sending out roots to nourish the plant, and to increase its propagation. This plant is so common that it is seldom necessary to sow the seed, as it will soon grow from spreading through other agencies. One of the best features of white clover is that it grows throughout the entire season, which is an im-

portant item with the farmer who has stock that must be pastured from spring until fall.

Crimson clover is not popular in this country, except in some portions of the eastern part of the country. Here it is sown about the first of August and used mostly for a cover crop, or a green manure crop. It can be used as hay, but it has not been raised for this purpose very much as yet, due to the hairy character of its stems and leaves.

## OTHER LEGUMES

We have now come to realize that alfalfa and the clovers are quite important in our American system of agriculture, but we must not conclude that these two plants are the only legumes which the farmer has to depend upon. There are quite a few other plants that have the ability of storing up nitrogen by means of these root bacteria. Such crops as soy beans, cowpeas, field pea, field bean, bur clovers, and peanuts are all classified as leguminous crops that not only improve the soil, but give the best returns in feeding value. Some of these legumes are confined to certain sections of the country, but we will discuss some of their outstanding characteristics, in order to obtain a general idea of their proper growth and cultivation.

The soy bean is rapidly making a place for itself in this country, despite the fact that it is a comparatively new crop in America. Adapted to almost any type of soil, the soy bean is finding favor everywhere. It grows especially

well on soils of a sandy character. A practice that is now coming into use is that of planting the soy beans with the corn. Some farmers have even planted the soy beans in the same hills with the corn, getting remarkable yields. Others drill it in with the corn, and put the mixture into the silo, thereby improving the feeding value of the silage materially. Soy beans can also be grown alone as a cultivated crop, and cut for either the seed or for hay. The seed is rich in protein and, when ground up, makes a fine stock feed. Some farmers plan to use this crop for hay, although it does not cure out as readily as some of the regular hay crops. However, when properly cured, it makes a fine hay.

The soy bean plant grows up to a bushy form, seldom reaching over two feet in height. For this reason, it is sometimes difficult to harvest it with a corn binder, when sown with the corn. If grown separately, it can be hauled to the silo at corn cutting time, usually one load of the soy beans to two loads of the corn being put in the silo. There are special soy bean harvesters now on the market to harvest this crop, but these have not as yet come into general use. Special bean threshers can be used to shell out the seed, or special screens can be inserted in the ordinary threshing machine to secure the seed of this crop.

In the growing of the crop, it should be borne in mind that soy beans, like all other leguminous crops, should first be inoculated with its special kind of bacteria. This is very important for best results. It can be sown broadcast,



if raised for hay, or if raised for its seed, it may be drilled in rows about three feet apart. When planted with corn, it can be planted with the ordinary corn planter, providing the corn and soy bean seed are occasionally stirred in the planter box, so that they will be thoroughly mixed. When planted in rows, it can be cultivated for the best part of the growing season, as the plant is short and bushy.

Cowpeas are to the South what alfalfa is to the West. The cowpea is a soil improver, and makes a splendid stock feed. The plant resembles the ordinary garden bean in foliage, but has long, slender pods, somewhat after the fashion of the garden pea. Owing to its need of a long growing season, it has not been raised in the northern states, but does its best in the southern states. One of its most useful characteristics is that it will grow on relatively poor soil, thus filling a long-felt need in some of the poorer sections of the South. The seed can be planted like soy beans, either broadcast, or in rows. Care should be taken that the seed is not planted until all danger of frost is over, as this plant is very susceptible to freezing.

Canadian field peas have been mentioned before in connection with pastures and hay crops. They are grown more in Canada than in this country, but along the Canadian border this plant finds much favor in this country. The most common use made of Canadian field peas is when they are grown with oats or barley, usually the former, and cut for hay. They are

also used in connection with oats and rape for hog pastures.

They are usually sown at the rate of one and one-half bushels of field peas to one bushel of oats to the acre. When sown with another crop, such as oats, the peas are held up much better from the ground than when they are sown alone. The common way of sowing this crop is by means of the drill, and either mixed with the oats or sown separately. This seed can be sown just as soon in the spring as the ground can be worked up.

Canadian field peas make a good hay with oats, and the making of this hay is not materially different from the making of the other kinds of hay. The field peas should be cut for hay before the pods are allowed to ripen. Just about the time the pods are filling is the ideal time to cut field peas. The grain crop, or oats should be in the proper hay stage by this time, if sown at the same time as the field peas. Another precaution to be observed is that too much raking of the hay will result in considerable loss of seed, so, for this reason, the hay should be cured in the cock rather than in the swath.

There are some varieties of the ordinary garden bean that are raised on a larger scale than the common garden plan. Some sections of the East raise these beans under field conditions, planting them in rows about three feet apart, so that they may be cultivated by horse drawn implements. Beans require a fairly warm soil before they will commence to make growth, therefore they cannot be planted quite

as early in the spring as the other legumes. They are sown at the rate of one-half bushel per acre. There is a regular bean harvester on the market that cuts the plant off near the surface of the ground, so that a clean crop can be harvested. The vines are hung on a pole to dry out, and when perfectly dry, they may be flailed, or threshed out with a regular bean thresher.

Vetch is another legume that is raised to a great extent, especially as a cover crop and soil improver. It is usually sown on the land during the latter part of the summer and allowed to remain on the soil until the following spring, when it may be plowed under. This aids in the humus content of the land, as well as increasing the nitrogen supply. Sometimes this crop is sown with rye as a cover crop, thus making a splendid soil renovator.

The last legume we will discuss here is the common sweet clover. This has grown as a weed in most parts of the country, and is probably familiar to most people. The plant is a tall, rank growing biennial, the flowers being produced in long spikes. While sweet clover has a feeding value about equal to alfalfa, it is not nearly as palatable, and animals do not care much about it as a feed, as the stems are especially thick and woody. In some places it is used as a soil improver. Where it is artificially sown, about fifteen pounds of seed are sown to the acre.

## POTATOES

This Irish potato is grown in nearly all countries of the civilized world, and in nearly all parts of our own country we find this important crop in evidence. It is not only grown as a field crop, but many town people raise at least a few early potatoes for their own use, to last them until the late potatoes come on the market. The Irish potato differs from the other crops that we have studied about in regard to its method of propagation. When we speak of "seed" potatoes, we do not mean the real seed, but the real potato, or tuber, cut up into pieces, as this is the popular method of reproducing this particular crop. The ordinary potato has several indentations, or "eyes" which have the faculty of sprouting and producing a new plant. In fact, most of the common potatoes do not produce genuine seed any longer. When the farmer gets ready to plant his potatoes, he cuts up these potatoes into several pieces, each piece containing at least one "eye," and plants them in a well-prepared seed bed at a depth of from three to five inches. It is generally best to fall-plow the land, and then work it up well in the spring if best results are to be obtained.

There are many different varieties of potatoes now being grown, and these varieties are classed as early varieties, or late varieties. Some of the common early varieties are the Early Ohio, Early Rose and the Bliss Triumph.

The Rural New Yorker, Burbank and Carman are popular late varieties.

Potatoes are planted at the rate of from 12 to 15 bushels to the acre. They are planted in rows about three feet apart, and about twelve to sixteen inches apart in the rows. In the sections where they are raised on a large scale, regular potato planters are used, where an extra hopper is provided for commercial fertilizer. In some of these eastern sections, such as in Aroostook County, Maine, this commercial fertilizer is often applied as heavy as one ton to the acre. Manure is more generally used in other parts of the country, being applied in the winter, or early spring.

During the growing season, the potatoes should be cultivated frequently to keep down weeds and to conserve moisture. It is a general custom in this country to "hill" the potatoes, after they have made good growth. This consists of throwing the soil up against the potatoes on each side. When the vines commence to die, it is about time to dig the potatoes. In the regular potato sections, machine diggers are employed. These diggers throw up the soil in the potato rows, and the potatoes are easily exposed to the surface of the ground, where they can be quickly harvested. However, in sections where potato raising is not a specialty, the potato fork is the usual tool used in harvesting the crop.

There are a few common insect pests and diseases that annually exact a heavy toll from the potato crop. Early and late blight, scab and rot are the usual diseases, while the Colo-

rado Beetle, more commonly referred to as the potato bug, and leafhoppers are the chief insect enemies.

Early blight appears during moist seasons on the leaves of the potato plant as dark, irregular spots. Late blight has nearly the same appearance, only somewhat later in the season. The best preventative known for this disease is Bordeaux mixture, which consists of a mixture of blue vitriol and stone lime. This mixture is sprayed upon the leaves, not once, but several times during the season, if the blight is serious. Scab is a very common disease of potatoes, and is usually rather difficult to eradicate, especially if the potatoes are raised on the same ground, year after year, or if scab-infected seed is used in planting the next crop. The surest way to eliminate scab from potatoes is to plant scab-free seed, in ground that has not had potatoes in for about five years. The formaldehyde treatment, explained in detail in one of the earlier chapters of this book is about the best method of treating potato seed infected with scab, but this method will be of little help if the ground is not free of the disease, also, because scab spores have the ability to live in the soil several years.

The potato bug is an annual pest that causes a great amount of damage, sometimes entirely ruining the crop if steps are not taken to stop the ravage. To kill these pests, a stomach poison is used, arsenate of lead, or Paris green being the common poisons used. These chemicals are mixed with water, and sprayed on the vines of the potato plant. This poisons

the leaves, which the potato bugs feed on. The result is, that the bugs are sufficiently poisoned to cause their death. Usually one application is not enough, as there are sometimes two or more different broods during the same season. One can usually tell when another brood is coming, however, as the eggs are usually laid in yellow clusters on the under side of the potato leaves. When Paris green is used, care must be taken that too much of this is not used, because the leaves will be seriously burned if the solution is too strong.

The leaf hopper is a more recent pest. In fact, many farmers are not yet acquainted with this small insect that flies about among the leaves, sucking the sap from the under side of the leaves. These leaf hoppers are small green colored flies, very quick of action. When they suck the sap from the leaves or vines, one might suspect that the plants are subject to "hopperburn." The tip of the older leaves will turn brown, giving the appearance of hopperburn. Gradually, however, the outside margin of the entire leaf turns brown, leaving a small portion of the mid-rib, still green. Because of the fact that these insects are equipped with piercing mouth parts, they do not chew the leaves, but insert their beak into the leaves and extract the sap. Hence, it is difficult to control this kind of an insect with stomach poisons like that applied for the potato bug. The best method of control for leaf hoppers is the Bordeaux spray, which prevents the large number of eggs laid on the leaves from hatching.

Potatoes are somewhat of a gamble when raised in large quantities, owing to market conditions. If the season has been favorable for potato growth, then there are thousands of carloads shipped to the markets in the fall of the year. While on the other hand, if there has been an unfavorable season, due to dry weather, diseases, or insects, then potatoes are high in price, and the farmer will not have many to sell. This difficulty has been remedied in part, however, for many potato growers have banded together and constructed warehouses, so that they can store their potatoes in the fall of the year, and feed the market gradually throughout the year. This gives the farmer a stable price, and releases him from the mercy of the early market. In fact, growers of many other farm products are organizing in this same manner, to enable them to obtain a fair price for their crops.

## CROP ROTATION

Reference has been made from time to time in these pages regarding rotation of crops. As this matter is extremely important in the growing of the farm crops already discussed, a few pages devoted to a further discussion of rotation of crops is deemed essential. A rotation of crops is generally understood to mean a series of different kinds of crops grown on the same piece of land each succeeding year. For instance, a cultivated crop might be grown on a certain field the first year, such as corn or potatoes. The next year



a grain crop might be raised on this field, such as oats, barley or wheat. Then a grass crop may be raised on the field the third year, such as clover, for example. By such a system, each of the three different types of plants can produce a much greater yield than when one crop is raised continually on this field. We will now inquire further into this matter, so that these reasons can be better explained.

While it cannot be said that crop rotation increases fertility, it does prevent the fertility from being rapidly exhausted. One of the best things about a rotation is that it is a big help in keeping down weeds. If one is raising a grass crop, or a grain crop, continuously on the same field, weeds will soon enter in and cause a great deal of difficulty. They are especially troublesome when the crop is to be sold, because if there are any weeds in the farmer's product, he is paid considerably less than the market price. By raising a cultivated crop once in every three or four years on this field, the farmer can get a good chance to eradicate these weeds.

The physical condition of the soil is greatly improved by the rotation of crops. Some plants are very deep-rooted, such as clover and alfalfa. When the roots of these plants penetrate into the subsoil for several feet, they open up this soil, especially after the plants are cut, and the roots allowed to decay. This provides a good channel for moisture and air in the soil, as well as subduing the subsoil. When one of the crops in the rotation is plowed under, as is sometimes the

case, or when a crop is included in the rotation for the express purpose of plowing it under, then the physical condition of the soil is restored to something like its original structure.

Then there is the matter of damages from insects and diseases. By raising one crop continuously, these pests are greatly encouraged in their destructive work, as they have the same host to live upon, in the same place, every year. But by rotating the crops, these destructive agencies do not have the opportunity to destroy the crops as much, as diseases and insects, in most cases, cannot travel very far from one field to another.

Crop rotation also makes for safer farming. When the entire farm is put to the raising of just one crop, the farmer may make a "killing" or he may "sink." At any rate, for the reasons already stated, he is lowering the fertility of his land. But more than this, seasonal changes, ravages of disease and insects, and other agencies that often enter in to ruin a crop, will have a minor effect on the farmer who has had enough foresight to raise a variety of crops rather than "putting all his eggs in one basket." Diversification of farming operations is always the safest policy to follow. The most successful agricultural states are those that have not only a variety of crops at their disposal, but countless live stock to go along with the crops. They both go hand in hand.

We have already mentioned in an earlier

chapter the advantage of crop rotation from a labor standpoint. One of the fine things about farming is that the farmer has got pretty nearly a different job every day of the year, outside of his regular chores. This is made possible by having a variety of crops that do not have to be cultivated or harvested at the same time. By planning the crops which he is to raise the farmer will be kept busy throughout the summer season, thereby being able to do most all of his own work, himself, instead of having the work come in spasms, which would necessitate hired help, or a loss from the crop.

From a practical standpoint, the rotation should include a cash crop. This is a crop that is sold for money, so that the farmer has something for exchange value. In fact, nearly every locality has its one particular cash crop. Tobacco, cabbages, cotton, wheat and other grains are all good examples of cash crops. While cash crops, or crops that are sold off the farm, are considered as soil robbers in some respects, the farmer must have cash, and the country must have his product. Hence, the cash crop proposition will always be a factor in our agriculture. When products are sold off the farm, and nothing is put back on the land to replace that which has been removed, then it must be obvious that the farmer is "losing ground." When a grain crop is sold for cash, instead of being sold to the farm animals, the least that the farmer can do is to put back the straw from the grain in the form of bedding, etc.

It is hoped that whoever reads these pages

will have gained some ideas of a practical nature. Agricultural methods have changed since our forefathers invaded this country, and it is imperative that the farmer keep up with the modern methods of agriculture, because he cannot follow the old methods and make the farm pay, no matter how sacrificing he and his good wife are. A good outline has been presented in this little book to follow in the culture of the chief crops raised in this country. The writer hopes that this information has not been given in vain.

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